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ABSTRACT

Prior research has identified four kinds of interaction that affect the learning process in distance education (D. Hillman, D. Willis, and C. Gunawardena, 1994; M. Moore, 1989). This paper defines, characterizes, and describes a fifth form of interaction of particular importance to certain learners, especially within the context of computer-mediated communication (CMC). This newly defined concept is referred to as "vicarious interaction." During a pilot study, students were identified as "direct interactors," "vicarious interactors," "actors," or "non-actors" (Sutton, 1999). Vicarious interactors are students who actively process the interactions of others. Within this framework the learning psychology associated with the process of vicarious interaction is comparatively analyzed. It is generally accepted that participatory interaction by students directly affects educational success; however, social and psychological characteristics of individual students often combine to inhibit their direct interaction. This paper presents the principle that direct interaction is not necessary for all students, and that those who observe and actively process interactions between others will benefit through the process of vicarious interaction. (Contains 46 references.) (Author/SLD)

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Vicarious Interaction: A Learning Theory
For Computer-Mediated Communications

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Abstract

Prior research has identified four kinds of interaction that affect the learning process in distance education (Hillman, Willis, & Gunawardena, 1994; Moore, 1989). This paper defines, characterizes, and describes a fifth form of interaction of particular importance to certain learners, especially within the context of computer-mediated communication (CMC). This newly defined concept is referred to as "vicarious interaction." During a pilot study, the author identified students as "direct interactors," "vicarious interactors," "actors," or "non-actors" (Sutton, 1999). Within this framework, the learning psychology associated with the process of vicarious interaction is comparatively analyzed. It is generally accepted that participatory interaction by students directly affects educational success; however, social and psychological characteristics of individual students often combine to inhibit their direct interaction. This paper presents the principle that direct interaction is not necessary for all students, and that those who observe and actively process interactions between others will benefit through the process of vicarious interaction.

Vicarious Interaction: A Learning Theory
For Computer-Mediated Communications

Computer-mediated communication (CMC) is rapidly becoming a common educational tool (Romiszowski & Mason, 1996). This increase in use of digital processing and communication technologies has made educator's understanding of the psychology of the learning process in this new environment critical. Recent research has focused on the general topic of student interaction within four defined categories: learner-content, learner-instructor, learner-learner, and learner-interface (Hillman, Willis, & Gunawardena, 1994; Moore, 1989). When at least one of these forms of interaction is incorporated into teaching, student achievement and satisfaction are enhanced (DeVries, 1996; Fulford & Zhang, 1993a). However, there has been very limited research on the effects of interaction within computer-mediated environments.

The primary structural and psychological differences between classroom teaching and distance education are attributable to the physical and social separation of the various participants. Such separation is inherent in CMC-based education, making interaction among students and with the instructor even more crucial. Consequently, educators must be aware of and address the extent, modes, and nature of interactions that can occur among physically remote participants.

Research has shown that some form of participatory interaction by students is critical to their success in face-to-face and in distance education courses (Kearsley, 1995; Nalley, 1995; Seaton, 1993; Selfe & Eilola, 1988). Individual student characteristics—both social and psychological—inhibit some students from participating in forms of direct interaction. Kearsley (1995) found that “the effectiveness of interaction may vary across individuals or

groups" (p. 2), and that individual preference for a certain level of interaction seems to have the greatest influence on the level of interaction that actually takes place. Ideally, individuals should be given control over the extent of their interaction, the form of their interaction, and whether they interact at all. This paper presents the principle that enhanced achievement and satisfaction may occur even when all students do not interact *directly*. Those who actively observe and cognitively process the interactions of other participants should substantially benefit from "vicarious interaction." Within this context, the present will: (a) define types of interaction that occur in distance education; (b) review the tangentially relevant literature conducted in the allied areas of distance education and CMC, social learning, interaction, vicarious interaction, social boundaries, and communication apprehension; and, (c) present the author's theory of "vicarious interaction" in the CMC environment.

Definition of Terms

The terms that are used in the relatively new area of computer-mediated communication are often not well-defined. Because the area is so new, terminology is continuously being created and changed. The following terminology will be defined for the purposes of this paper: (1) interaction, (2) learner-content interaction, (3) learner-instructor interaction, (4) learner-learner interaction, (5) learner-interface interaction, and (6) vicarious interaction.

Interaction

Much attention has been devoted to the definition of "interaction," a term that is often confused with "interactivity." Interactivity is an inherent feature of the medium, which allows the users to experience a series of exchanges by means of the technology.

Interactivity can also be defined as the degree of control a learner has over the sequencing of content (Schwier, 1991). By contrast, "interaction," is defined in terms of a learning process, objective, or outcome. Learning rarely takes place solely through unidirectional instruction. The social process of interaction is required for optimal learning (Lave & Wenger, 1991). Wagner (1994) defines interaction as:

... reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another. An instructional interaction is an event that takes place between a learner and the learner's environment. Its purpose is to respond to the learner in a way intended to change his or her behavior toward an educational goal. Instructional interactions serve two purposes: to change learners and to move them toward achieving their goals. (p. 8)

Interaction can also be understood as the way learners and instructors communicate their own ideas, perspectives, feelings, and knowledge over time and comprehend those of others.

Distance educators have identified four categories of what they term "interaction." These four types of interaction (discussed below) are referred to as learner-content, learner-instructor, learner-learner, and learner-interface (Hillman et al., 1994; Moore, 1989). Within the literature, the term "interaction" is occasionally used in a non-literal sense. The term "interaction," by its very definition, requires that at least two actors mutually influence one another. However, the types of interaction discussed in the existing literature does not necessarily fall within the literal definition of interaction. For example, content and interface can shape people's responses and can "... be said to influence and likewise be influenced through people's creation, action upon, and cognitive interpretation of that

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phenomenon" (Scheel & Branch, 1993, p. 9). However, content and a computer interface are inanimate, they are not "actors," and therefore cannot literally interact with human learners. Thus, for the purpose of this paper the term "interaction" will be used in its strict technical sense and will refer to communication between two actors, specifically learner-learner interaction and learner-instructor interaction.

Learner-Content Interaction

The type of interaction that takes place between the learner and the content is probably the most fundamental of the four types. The process we have traditionally identified as "learning" takes place when a student interacts with the subject matter or course content. This content can be in the form of a paper-based text, radio or television programming, audio or videotape, or, it can be in a computer-implemented form such as a CD, computer program, or online communication. Sometimes a student interacts only with the course content and never interacts with the instructor, other students, or the interface.

Learner-Instructor Interaction

A second type of interaction occurs between the learner and the instructor. This form of interaction is "... regarded as essential by many educators, and as highly desirable by many learners" (Moore, 1989, p. 2). The instructor serves as an expert who plans the instruction to stimulate student's interests and to motivate their participation in the learning process. Learner-instructor interaction can vary from the instructor making a presentation of information to a group of students to the instructor interacting one-on-one with a student regarding an individual concern.

Learner-Learner Interaction

Historically, there have been limited opportunities for integrating the third type of interaction, learner-learner interaction, into educational settings. Instead, concerns have focused on the areas of learner-content and learner-instructor interaction. The development of distance education technology has made it increasingly possible for learners to interact with one another. Moore (1989) asserts that learner-learner interaction can be "... an extremely valuable resource for learning, and is sometimes even essential" (p. 4). Research indicates that students who interact regularly with their instructor and with fellow students are more motivated and have better learning experiences (Garrison, 1990). Learner-instructor and learner-learner interactions are arguably lost in the translation from face-to-face to distance education (Barnes & Lowery, 1998).

Learner-Interface Interaction

While Moore (1989) initially defined three categories of interaction, Hillman et al. (1994) added a fourth category that is unique to distance education: the learner-interface interaction. Hillman et al. (1994) discuss the concept of interaction as it pertains to distance education and argue that emerging technologies in distance education call for this fourth type of interaction. Learner-interface interaction has been described as the interaction that takes place between the learner and the technology used to implement the distance education process. The students have no choice but to use the technology to interact with at least the content and the instructor.

Vicarious Interaction

This paper defines vicarious interaction as a fifth category of interaction that has not been accounted for by Hillman et al. (1994) and Moore (1989). As used in this paper,

"vicarious interaction" takes place when a student actively observes and processes both sides of a direct interaction between two other students or between another student and the instructor. Interaction in this sense is not first hand, but one level removed, hence the term "vicarious."

The definition of the term vicarious interaction can be better understood in comparison to some closely allied terms as used in the literature. As these various terms are used in this paper, "vicarious interaction" occurs when a learner absorbs and processes an observed interaction between others. A person involved in the process of vicarious interaction is a "vicarious interactor" and is involved in the process of "vicarious learning." Vicarious learning occurs when a learner observes the actions (not interactions) of another and the results of those actions. A "vicarious experience" involves an empathetic identification with an actor's conduct and may or may not involve vicarious learning.

Overview of the Literature

Distance Education and CMC

A review of the current literature indicates that distance education can be defined as a technologically-implemented learning process in which students and the instructor are separated from one another physically and temporally (e.g., McIsaac & Gunawardena, 1996; Moore, 1990). Various types of media have been used in distance education, but recent technical improvements allow for both synchronous (real time) and asynchronous (time-shifted) communications.

A type of media that is often used in distance education, called computer-mediated communication (CMC), can be defined as a system for information flow that enables learning participants to communicate and interact with one another over time (e.g.,

Romiszowski & Mason, 1996). The factors that distinguish CMC from other media include: (a) its capability for use in both synchronous and asynchronous, multi-party communication; (b) its ability to enable open interaction between all participants; and (c) its adaptability to the individual learning needs and schedules of students (Harasim, 1996). The use of CMC in higher education has grown substantially over the past several years. CMC has been implemented by means of e-mail, newsgroups, listservs, online chats, bulletin boards, asynchronous discussions, computer conferencing, and streaming video and audio. Of particular interest in this paper are interactions that take place during asynchronous, text-based discussions, where students are not seen or heard. Although CMC has been said to promote interactions among students and the instructor, students have the choice to interact directly or not.

Social Learning

Over the past decade, the focus of distance education has moved progressively from isolated, individual learning (as in correspondence study) toward interconnected, social learning. This transition has been coincident with changes in teaching paradigms and the expanding availability of computer and communication equipment. The emergence of the constructivist view of learning has influenced the growing interest in group learning. Constructivists believe that knowledge is a result of social construction of meaning in a particular social context (Brandon, 1999). Students are increasingly encouraged to interact, not only with their instructor, but also with one another. The teacher's role has been expanded from that of an information transmitter to include the role of facilitator in an environment where interconnected learners are expected to challenge ideas and negotiate meaning through multiple interactions among all participants. Although there is a great deal

of interest in the area of social learning, including cooperative learning, collaboration, and social interaction, research has not yet addressed the influence social interaction has on cognitive learning (Webb & Palincsar, 1996).

One of the better known social learning theorists is Piaget who developed the sociocognitive conflict theory. This theory states that when a cognitive conflict occurs during social interactions, learners experience disequilibrium, which causes them to rethink their existing ideas (Piaget, 1985). Similarly, in cognitive-elaboration theory, learners cognitively process ongoing interactions (O'Donnell & O'Kelly, 1994). "Interaction with others leads to active processing of information by the individual, which in turn modifies the individual's cognitive structures" (Brandon & Hollingshead, 1999, p. 116). Social-psychological factors, identified in the literature, that influence social interactions include dominance, jealousy, prejudice, and defensiveness (Damon, 1984). These interpersonal dynamics often affect cognitive change in social interactions. These social-psychological factors influence the extent, mode, and nature of interactions that take place in distance education courses and play a big part in determining a person's tendency to be a "direct interactor," a "vicarious interactor," an "actor," or a "non-actor".

Another area of interest within social learning theory is the area of modeling or observational learning. Beginning early in life, people learn new and corrected behaviors from observing others without necessarily interacting with them. According to Bandura (1986), observational learners go through four stages: (1) attention; (2) retention; (3) production; and (4) motivation. During the attention stage, the observer analyzes and absorbs the behavior of the model. In the second stage, retention, the observer mentally represents and processes the modeled behavior. During the production stage, the learner

overtly expresses the modeled behavior. The final stage, motivation, involves the observer's anticipation of reinforcement. The cognitive processes that take place during vicarious interaction are in many ways similar to that of observational learning and modeling. These well-established social learning theories serve as the basis for the principle of vicarious interaction presented in this paper.

Interaction

A review of current literature reveals that the traditional concepts of interaction have provided a rich area for research within the field of distance education. Past research has clearly established that higher levels of interaction in the traditional classroom setting is associated with improved achievement (Gorham, 1988; McCroskey & Andersen, 1976; Ritchie & Newbury, 1989) and enhanced student attitudes (Althaus, 1997; Anderson & Meyer, 1988; Garrison, 1990; Hackman & Walker, 1990; Ritchie & Newbury, 1989). These findings correspond with the realities of any interactive process that requires participants to be actively engaged in the process of content analysis and exchange.

The expansions of distance education and recent innovations in technology have allowed for increasing interaction between and among learners and instructors. Numerous studies have concluded that increased levels of interaction result in increased motivation, more positive attitudes toward learning, higher satisfaction with the instruction, deeper and more meaningful learning, and higher achievement (Entwistle & Entwistle, 1991; Garrison, 1990; Hackman & Walker, 1990; Ramsden, 1988; Ritchie & Newbury, 1989; Scheel & Branch, 1993; Wagner, 1994). Providing opportunities for all kinds of interaction is important to the success of most students involved in distance education.

Further studies have examined the relationship between interaction and student satisfaction. Irani (1998) found that the increased communication potential of CMC could serve to improve students' attitudes and satisfaction with the course and their perceived outcome in the course. Hackman and Walker (1990) measured student perception of learning and satisfaction in a televised classroom. The authors found that interactions in the classroom greatly influenced students' perceived learning and course satisfaction. Regardless of the direct impact interaction has on actual achievement, these findings indicate that interaction is an important predictor of satisfaction with instruction. Other findings indicate that while interaction does not directly affect performance in a televised classroom, students who experienced high levels of interaction expressed positive attitudes about instruction (Ritchie & Newbury, 1989). These results may indicate that positive attitudes influenced achievement or that students with positive attitudes were more likely to interact.

A study by Fulford and Zhang (1993a) explored the relationships between learners' perceptions of interaction and their satisfaction with instruction in a distance education course. After describing many indicators of the need for interaction, the researchers hypothesized that students' perceptions of interaction are important indicators of their satisfaction with instruction. The researchers used the context of interactive television to explore these questions. Through a questionnaire, the researchers measured students' perceptions and degree of instructional satisfaction. Results indicate that a student's perception of the general learner-learner and learner-instructor interaction within the class had more influence on instructional satisfaction than did a student's specific perception of his or her own interaction.

Face-to-face teaching incorporates a wealth of nonverbal cues, intonations, and elements of body language, which not only convey information but also maintain engagement with and among the students present. Unfortunately, such rich and complex elements of human communication are often minimized or eliminated in CMC, thus complicating or inhibiting interaction. Learner-instructor and learner-learner interaction are arguably lost in the translation from face-to-face to distance education (Barnes & Lowery, 1998). Improvement in written communication skills can partially compensate for some of the attenuation of social interaction associated with a transition from face-to-face teaching into the world of distance education (Salaberry, 1996). However, the current paper proposes that direct interaction may not be necessary for all students to enjoy some of the benefits of interaction.

Vicarious Interaction

In traditional classroom settings, higher levels of interaction result in more positive attitudes and higher achievement (Anderson & Meyer, 1988; McCroskey & Andersen, 1976; Ritchie & Newbury, 1989). Unfortunately, a number of otherwise motivated students are shy, hesitant, or insecure. Accordingly, these students avoid the very interaction that could enhance the quality of their learning experience. The principle submitted here is that direct interaction by this class of learners may not be necessary for them to achieve learning benefits. This paper defines vicarious interaction as a fifth category of interaction that occurs in CMC: a derivative form of interaction that is distinct from the four categories previously defined in the literature (Hillman et al., 1994; Moore, 1989).

This additional kind of interaction, termed "vicarious interaction," takes place when an otherwise passive student actively observes, absorbs, and processes the ongoing

interactions between other students and between other students and their instructor. Such students, referred to as vicarious interactors, can enjoy benefits that are essentially equivalent to those achieved by direct interactors. This enhanced outcome can be achieved without direct interaction in the traditional sense. The vicarious interactor cognitively processes content while absorbing the interactions of others. The cognitive processing that takes place at this stage, although relatively passive, nonetheless enhances the learning process. Through this mental activity, the vicarious interactor is better able to structure and absorb course content.

In order to be clear, the actions of a vicarious interactor are contrasted with those of the other types of participants involved in the author's theoretical structure and analysis. In the present paper, four types of interactors are considered. They are categorized and defined as follows:

1. "Direct interactors" are students who directly interact with other students or the instructor.
2. "Vicarious interactors" are students who actively process the interactions of others.
3. "Actors" are students who provide unilateral input regardless of the reactions or comments of others.
4. "Non-actors" are students who do not participate in the communication process.

Figure 1 illustrates the different information flow that takes place during a direct interaction and compares it to a vicarious interaction.

Insert Figure 1 about here.

In the figure, four participants are illustrated: the instructor and three learners. Each of these participants has the ability to communicate with the other participants through an interface such as that used in asynchronous discussions. Each participant also has the ability to interact with the course content directly or through the interface. Direct interaction, a bi-directional phenomenon, is illustrated in the figure by the two arrows between the learner at the left and the instructor at the top and the learner at the bottom of the diagram. By contrast, vicarious interaction involves a unidirectional flow of information as illustrated by a single arrow receiving information from the direct interaction. The direct interactor processes information before it is sent to a recipient and again when feedback is received from the recipient. A vicarious interactor processes the exchange between two or more direct interactors.

Just as different learners are said to "interact" with course content in different ways (Scheel & Branch, 1993), learners literally interact with each other in different ways. Different patterns of communication are seen as a natural phenomenon especially by those who believe that everyone's perception of the world is different (Hoopes, 1981).

The theoretical framework of this paper does not assume that all kinds of learners will benefit from vicarious interaction. Students who are extroverted and generally verbal in a classroom context will carry this over to the CMC context (Cravener & Michael, 1998) and are not expected to benefit from vicariously interacting because doing so goes against their nature. However, learners who are not interested in or have not learned the skills

associated with social learning or those who tend to be withdrawn, shy, or reluctant to participate in overt interaction may benefit the most from interacting vicariously.

Social Boundaries

One of the most difficult but interesting aspects of prior research has been the social effect of CMC on participant learning. Educators and researchers often express enthusiasm about CMC's ability to overcome social boundaries and prejudices. Studies have shown that student anonymity online allows for greater equality and increased interaction. Self-awareness in interactions is more important than conforming to the majority opinion in CMC (Matheson & Zanna, 1989; Smilowitz, Compton, & Flint, 1988).

Others depict CMC as a culture unto itself. "Culture" has been described as "... patterns of behavior and thinking by which members of groups recognize and interact with one another. These patterns are shaped by a group's values, norms, traditions, beliefs, and artifacts" (Scheel & Branch, 1993). As members of a group interact in a particular environment, a "culture" is gradually developed. The culture influences and defines the rules and norms that shape future interactions.

Chester and Gwynne (1998) developed strategies—including the use of aliases—to assess a CMC learning community and to encourage students who were hesitant to participate in CMC. Through the exploration of student participation, this study examined the emergence of a community within a CMC learning environment. Of particular interest was the impact of enforced pseudonymity on teaching and learning. The researchers found that the use of aliases helped them overcome their inhibition and provided them with the opportunity for enhanced interaction. Students reported that they felt more confident, and therefore contributed more in the CMC environment than they would have in a face-to-face

course. This was particularly true among the Asian students, one of whom explained that "... online there was no pressure to adhere to the scripts normally governing classroom behavior" (p. 5). Some students reported feeling more comfortable interacting within their own cultural group in a traditional classroom. When involved in CMC, these students were able to form relationships across social and cultural boundaries. According to these findings, issues of appearance, gender, and accent are eliminated when students communicate online. Unfortunately, the benefits of neutrality achieved through online anonymity were offset in some cases by feelings of aggression toward or distrust of other unidentifiable students. Although social boundaries can be overcome by giving participants freedom online, the freedom frequently leads to antisocial behavior (Postmes, Spears, & Lea, 1998). Chester and Gwynne (1998) provide significant insight on the impact of physical appearance, culture, and gender on learning interactions.

Communication Apprehension

CMC is often implemented with the hope that shy or reluctant students will be encouraged to participate more fully in discussions and achieve the learning benefits. Research has shown that asynchronous interactions in CMC tend to equalize participation. In CMC, there is no limit on when a communication takes place or how long a student takes to read or compose a communication. In the CMC environment, dominant students have fewer occasions to control communications and students who are hesitant in face-to-face communication have more opportunities to interact (Cummings, 1998; Harasim, 1996; Kiesler & Sproull, 1992). CMC also offers shy and passive students additional time to compose contributions and responses. This additional contemplation time results in more reflective interactions regardless of a student's personality (Harasim, 1996).

Cravener and Michael (1998) studied the relationship between the psychological characteristics of students in an undergraduate, campus-based course and their selection of either face-to-face or CMC, specifically the use of asynchronous email. Results indicate that those students who have a tendency to communicate in face-to-face discussions were the same students who actively participated in CMC discussions. Students who were hesitant to participate in face-to-face discussions did not participate in CMC discussions.

Students who experience communication apprehension are often unable to communicate even if the course design provides significant opportunities for interaction. McCroskey and Andersen (1976) found that students who were anxious about communicating and therefore did not interact and achieve lower scores on achievement tests. These important findings suggest that an instructor cannot simply assume that students will voluntarily initiate interaction. Those who experience communication apprehension and who are not provided with the means to interact comfortably will be at a measurable disadvantage. These hesitant or withdrawn students may achieve at a higher level in more structured course settings. Students who do not feel confident with their understanding of the content may want to hide their lack of knowledge from their peers (Harasim, 1996). Harasim (1996) states that "In a classroom one can always be quiet, but in a learning network the student is forced into participation . . ." and asks, "How will this affect various types of learners" (p. 210)?

With respect to the present paper, it is theorized that students experiencing communication apprehension in either face-to-face or CMC discussions will still attain the benefits of interacting vicariously.

Vicarious Interaction

To date an exhaustive search of the literature has revealed no research on the topic of "vicarious interaction" as that concept is defined and used in this paper. Two authors have published articles or presented papers that incidentally include the term "vicarious interaction" (Fulford & Zhang, 1993a; Fulford & Zhang, 1993b; Kruh & Murphy, 1990; Zhang & Fulford, 1994). The article by Fulford and Zhang uses the term in a course using interactive television and state solely that "psychological interactivity is predominantly vicarious in nature" (Zhang & Fulford, 1994, p. 64). Both this statement and the context to which the researcher presented it bear no conceptual relationship the use of the term in the present paper. The second reference to the term vicarious interaction in the literature was in a paper presentation that looked at interaction in teleconferencing. This report does not further develop the statement quoted in the preceding sentence (Kruh & Murphy, 1990). Vicarious interaction is discussed here in terms of four types of interactors, achievement and satisfaction, cognitive processing, cognitive reprocessing, and the vicarious interactor's characteristics.

Four Types of Interactors

As defined earlier, vicarious interaction takes place when an otherwise passive student actively observes, absorbs, and processes the ongoing interactions between other students and between other students and their instructor. The four types of interactors that emerged from data collected in a pilot study included direct interactors, vicarious interactors, actors, and non-actors and led to the idea that learners interact with each other in different ways (Sutton, 1999).

Potential Impact on Achievement and Satisfaction

Vicarious interactors may have achievement and satisfaction scores approximating those of students who directly interact. A vicarious interactor can achieve a desired level of knowledge by actively observing others interacting with the instructor and with other students, even without direct, participatory interaction in the traditional sense. The number and quality of interactions among other students (learner-learner) and between other students and the instructor (learner-instructor) are of particular importance to the benefit realized by vicarious interactors. The vicarious interactor is involved in a derivative experience, which may be limited by the quality of the underlying experience itself.

Cognitive Processing

The cognitive processing of a vicarious interactor parallels that of the direct interactor during the first stages of processing. During the first stage, the vicarious interactor cognitively processes content while absorbing the interactions of others. The cognitive processing that takes place at this stage, although relatively passive, enhances the learning process because as a result of this mental activity, the vicarious interactor is better able to organize and absorb course content.

Anticipatory interaction. Vicarious interaction has some of the characteristics of what the author refers to as "anticipatory interaction" where students are asked by the instructor to think of and formulate a response, knowing that he or she may be called upon to respond. The prospect of being called upon in the presence of peers motivates students to mentally interact with the instructor's question and thereby interact in anticipation of direct interaction, which may or may not occur, depending on which student is asked to respond.

The cognitive process that transpires when a student experiences anticipatory interaction is similar to but less intense than the process of vicarious interaction.

Overt expression. It is suggested that the incremental benefits achieved through vicarious interaction will not be as great as those achieved through direct interaction. This disparity is attributed to the fact that the vicarious interaction does not involve the more intense and intellectually challenging process of mentally originating, organizing, and physically expressing a coherent response that incorporates the learned content (Brandon, 1999; Webb & Palincsar, 1996). "Through the process of articulating covert processes and strategies, learners are able to build new and modify existing knowledge structures" (Jonassen, Davidson, Collins, Campbell, & Haag, 1995, p. 13). The vicarious interactor does not participate in the organizational and cognitive processes required for original overt expression. This process may involve the simple formation of sentences in one's native language. Overt expression may also involve the effective translation of a question or response back into the language used in the course. In any case, overt expression requires the direct interactor to undergo highly sophisticated information processing involving the brain, the eyes, the hands, and, depending on the technology involved, perhaps the voice. This process of translating thoughts from the intellectual realm into the physical realm of speech or writing requires multiple acts of high level processing, which themselves enhance organization, retention, and comprehension. By contrast, the vicarious interactor, while mentally engaging the content inherent in the direct interaction of others, does not physically manifest his or her understanding of that content. Because the vicarious interactor does not physically formulate responses, his or her achievement, while significant in certain students, is not expected to be as great as that of the direct interactor.

Cognitive Reprocessing

Additional time and effort goes into a direct interactor's contribution when the student knows that the response will be reviewed by a critical audience and remain permanently recorded. After reducing an idea to writing, a direct interactor edits and modifies his or her contribution before transmitting the message to other participants. This reprocessing, reformulation, and reorganization of content does not occur in vicarious interaction. Further, the vicarious interactor may be less motivated due to the absence of any actual or potential evaluation or reaction by others.

Finally, the comments and criticisms received from others through direct interaction cause the direct interactor to either reevaluate or confirm their analysis of the course content. In any case, direct interactors are reprocessing, annotating, and correcting their understanding of the content to a higher degree than those who participate vicariously.

Interactor Characteristics

The author does not expect that all kinds of learners will preferentially benefit from vicarious interaction. Those students who are subject to communication apprehension shall benefit from vicarious interaction, which serves to remove the cause of their anxiety. Students who tend to be withdrawn, shy, or reluctant to participate in overt interaction may define the group that will receive the greatest benefit by interacting in discussions vicariously. This category of learners will probably benefit in proportion to their ability to motivate themselves. Passive but motivated learners may not be interested in or may not have learned the skill associated with social learning. By contrast, students who are highly social, animated, and verbal in a classroom context can be expected to carry their gregarious nature over to the CMC context (Cravener & Michael, 1998). These less-inhibited students

would not be expected to benefit from the process of vicarious interaction. Vicarious participation is inconsistent with their social nature and the greater benefits they would achieve through direct interaction would probably mask any added benefit realized through their having participated vicariously in the interaction of others.

Conclusion

The vicarious interactor does participate in the most basic steps through which the learning process must proceed. The cognitive reprocessing of content, although derived from the interaction of others, shall enhance the learning process. The author anticipates that not all kinds of learners will participate in or benefit from vicarious interaction and expects that the benefits of interacting vicariously will not be as great as in the case of direct interactors. However, this separately defined type of interaction is well suited for motivated students who are apprehensive about directly interacting. If this type of interaction is recognized, taught, and actively pursued, this kind of student can experience most of the achievement and satisfaction benefits enjoyed by their more extroverted peers.

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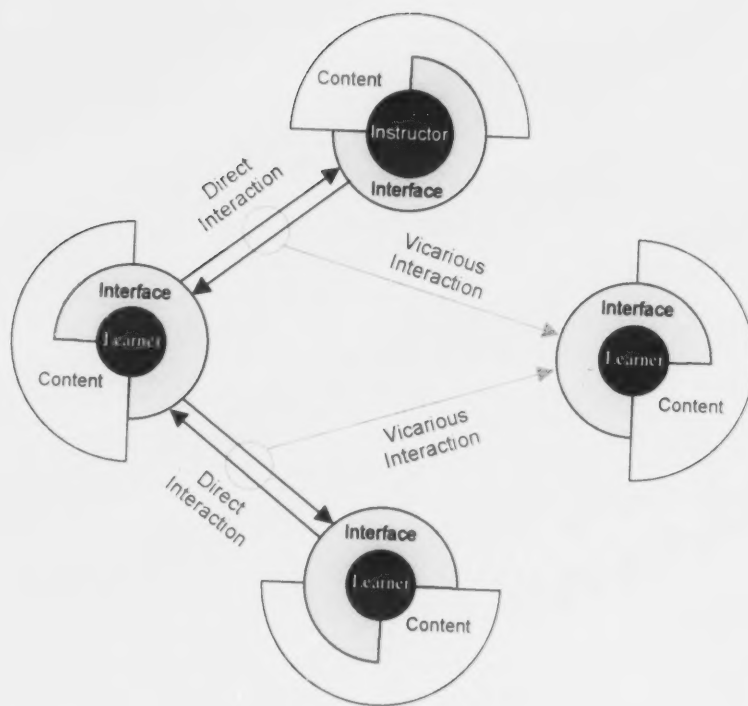
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Figure Captions

Figure 1. A schematic illustration of information flow among learning participants during their direct and vicarious interaction in a computer-mediated environment.



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